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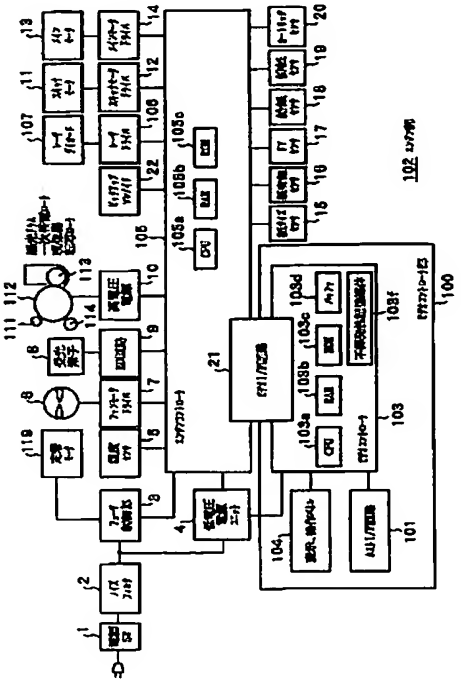
(54)【発明の名称】　画像形成装置及びその制御方法

(57)【要約】
【課題】　商用電源の半サイクル毎の電流の変動が少ない画像形成装置及びその制御方法を提供する。
【解決手段】　定着ヒーター１１９による発熱に基づき記録媒体に現像剤を定着させる際に、温度センサー５により定着ヒーター１１９の温度を検出し、検出された温度に応じてフューザ制御部３によるヒーター１１９の発熱量を制御する。その制御は、商用電源の半サイクル毎にヒーター１１９Ａ，１１９Ｂへの通電量を位相制御により制御し、複数の半サイクルを一纏まりで一定の制御電力を設定し、設定された制御電力に基づきヒーター１１９の発熱量を制御する。



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【特許請求の範囲】

【請求項１】　複数の発熱手段による発熱に基づき記録媒体に現像剤を定着させる定着手段と、

前記発熱手段により発熱された定着手段の温度を検出する温度検出手段と、前記温度検出手段により検出された温度に応じて前記複数の発熱手段の発熱量を制御する制御手段とを有し、

前記制御手段は、商用電源の半サイクル毎に前記複数の発熱手段への通電量を位相制御により制御し、複数の半サイクルを一纏まりで一定の制御電力を設定し、前記設定された制御電力に基づき前記複数の発熱手段の発熱量を制御することを特徴とする画像形成装置。

【請求項２】　前記制御手段は、前記発熱手段に通電を開始するタイミングが商用電源の９０°位相と２７０°位相となるような通電量の場合には、これ以外のタイミングで通電パターンを設定し、複数の半サイクルを一纏まりとして通電を行うことを特徴とする請求項１に記載の画像形成装置。

【請求項３】　前記制御手段は、前記発熱手段に通電を開始するタイミングが商用電源の８１°より大きく９９°より小さい位相、又は１６０°より大きく２７９°より小さい位相となるような通電量の場合には、これ以外のタイミングで通電パターンを設定し、複数の半サイクルを一纏まりとして通電を行うことを特徴とする請求項１に記載の画像形成装置。

【請求項４】　前記通電パターンの設定を半サイクル毎の電力変動が少なくなるように設定することを特徴とする請求項２又は３に記載の画像形成装置。

【請求項５】　複数の発熱手段による発熱に基づき記録媒体に現像剤を定着させる際に、前記発熱手段による発熱温度を検出する温度検出工程と、

前記温度検出工程で検出された温度に応じて前記複数の発熱手段の発熱量を制御する制御工程とを有し、

前記制御工程は、商用電源の半サイクル毎に前記複数の発熱手段への通電量を位相制御により制御し、複数の半サイクルを一纏まりで一定の制御電力を設定し、前記設定された制御電力に基づき前記複数の発熱手段の発熱量を制御することを特徴とする画像形成装置の制御方法。

【請求項６】　前記制御工程は、前記発熱手段に通電を開始するタイミングが商用電源の９０°位相と２７０°位相となるような通電量の場合には、これ以外のタイミングで通電パターンを設定し、複数の半サイクルを一纏まりとして通電を行うことを特徴とする請求項５に記載の画像形成装置の制御方法。

【請求項７】　前記制御工程は、前記発熱手段に通電を開始するタイミングが商用電源の８１°より大きく９９°より小さい位相、又は１６０°より大きく２７９°より小さい位相となるような通電量の場合には、これ以外のタイミングで通電パターンを設定し、複数の半サイクルを一纏まりとして通電を行うことを特徴とする請求項５に記載の画像形成装置の制御方法。

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【請求項８】　前記通電パターンの設定を半サイクル毎の電力変動が少なくなるように設定することを特徴とする請求項６又は７に記載の画像形成装置の制御方法。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は、電子写真プロセスを用いた画像形成装置の定着ヒーターの温度制御に関するものである。

【０００２】

【従来の技術】図１は、一般的な画像形成装置の構造を示す断面図であり、この例ではレーザビームプリンタの場合を示している。同図において、１００はコントローラ部であり、不図示のホストコンピュータから１０１のホストＩ／Ｆ回路を介して入力したコードデータである電気信号をビデオコントローラ１０３でドットイメージに展開し、ビデオコントローラ１０３内部のメモリに一旦格納した後、後述するエンジン部にビデオ信号として送出する。

【０００３】１０２は電子写真プロセスを用いた画像形成を行うエンジン部であり、内部の各要素は、エンジンコントローラ１０５により制御され、コントローラ部１００との各種信号の授受もエンジンコントローラ１０５を介して行われる。ここで、エンジンコントローラ１０５のビデオインタフェース部（不図示）に入力されたビデオ信号は、レーザドライバ１０６に送出され、半導体レーザ１０７のＯＮ／ＯＦＦが制御される。この半導体レーザ１０７から出射されたレーザ光１１０はポリゴンミラー１０８により偏向されて感光ドラム１１２の長手方向の走査光となり、ミラー１０９を介して感光ドラム１１２上に投影される。

【０００４】感光ドラム１１２は、図中の矢印方向に回転し、一次帯電器１１１により一次帯電された後、レーザ光１１０のＯＮ／ＯＦＦに応じた露光を受け、感光ドラム１１２表面に静電潜像が形成される。そして、現像器１１３により着色荷電粒子（以下、トナーと称する）が付与され、顕像が得られた後、転写帯電器１１４により、給紙カセット１２０から給紙ローラ１２１によって一枚ずつ取り出された記録媒体に上記顕像が写し取られる。また、転写残りトナーは感光ドラム１１２の表面よりクリーニング器１１５により払拭され、感光ドラム１１２は次の画像形成工程に備える。

【０００５】一方、未定着トナー像が載った記録媒体は定着器１１６に挿通され、永久定着像が得られた後、最終プリントとして記録媒体は図中の矢印方向に従って機外に排出される。尚、図中の矢印は給紙カセット１２０から取り出されて搬送される記録媒体の給送奇跡を示すものである。また、定着器１１６は中空の定着ローラ１１７にヒーター（定着ヒーター）１１９を有しており、ヒーター１１９に通電することで定着ローラ１１７が過

熱され、定着ローラ１１７の表面温度を検知するセンサ（不図示）の出力が温度コントローラ（不図示）に入力され、ヒーター１１９がＯＮ／ＯＦＦされ、所定の表面温度が維持される。加圧ローラ１１８は付勢手段（不図示）により定着ローラ１１７に押圧され、記録媒体に載った状態の未定着トナーが定着ローラ１１７と加圧ローラ１１８とのなすニップ内で記録媒体と共に加熱、加圧され永久定着される。

【０００６】また、エンジンコントローラ１０５は定着器１１６の定着ローラ１１７に接して取り付けられた温度センサによって定着器１１６の温度を判断し、詳細は後述するフューザ制御部を用いて定着ヒーター１１９を制御して定着器１１６の温度制御を行う。

【０００７】図２は、定着ヒーターと加圧ローラの構成を示す側断面図である。図２に示すように、定着ヒーター１１９は２本のヒーター（Ａ）及びヒーター（Ｂ）が並列に接続され、それぞれ別々の制御回路によって２本のヒーターに流される電流が制御されている。

【０００８】この制御は、エンジンコントローラ１０５内のＣＰＵによって行われており、具体的には、温度センサーにより得た温度情報に基づき、それぞれのヒーターに流す電流を制御するトライアックを用いて流す時間を変化させることでそれぞれのヒーターの発熱量を加熱し、所望の温度になるように制御している。ここで、それぞれのヒーターに流す電流は、図３に示すように、商用電源の半サイクルの期間で通電している時間（ＯＮ時間）を変化させて制御を行う。制御プログラムには、半サイクルの全てがＯＮしている時の電流を１００％とし、全てＯＦＦしている時を０％とし、電流値が等分できるように通電する時間をあらかじめ記憶している。例えば、４０％の電流を流す場合は０°～９９°の位相までをＯＦＦに制御し、９９°～１８０°の位相までをＯＮに制御する。この制御プログラムは、位相角度をゼロクロスからの時間で設定し、例えば商用電源の周波数の５０Ｈｚの９９°位相は、５．５１ｍｓｅｃになる。プログラムは、ヒーターに４０％の電流を通電するときには、５．５１ｍｓｅｃにタイマをセットし、ゼロクロス信号を受けてからタイマをスタートし、５．５１ｍｓｅｃが経過してタイマがストップすると制御信号をＯＮにする。電流制御回路（トライアック）は、ＯＮ信号を受けて電流の通電を開始し、次のゼロクロスまで通電を続ける。

【０００９】また、ヒーター（Ａ）の発熱量に対してヒーター（Ｂ）の発熱量が２倍になるように制御するには、ヒーター（Ｂ）に流す電流がヒーター（Ａ）に流す電流の２倍になるように電流を流す時間を制御する。具体的には、図４に示すように、ヒーター（Ａ）とヒーター（Ｂ）を両方フルに発熱させた場合を１００％としたときに、４５％で発熱制御する場合を考えると、ヒーター（Ａ）を１５％発熱させ、ヒーター（Ｂ）を３０％発熱させて両方併せて４５％になるようにする。

【００１０】図５は、制御電力に対するヒーター（Ａ）とヒーター（Ｂ）のＯＮタイミングの関係を示す図である。制御電力を４５％に制御する場合は、ヒーター（Ａ）を１０９°位相でＯＮに制御し、ヒーター（Ｂ）を８１°位相でＯＮに制御する。つまり、ヒーター（Ａ）には、ゼロクロスから６．０３ｍｓｅｃ後に電流を流し始め、ヒーター（Ｂ）にはゼロクロスから４．４９ｍｓｅｃ後に電流を流し始める。そして、ヒーター（Ａ）及びヒーター（Ｂ）に流す電流を次のゼロクロスのタイミングでＯＦＦにする。

【００１１】尚、ヒーターは抵抗負荷であり、ヒーターにかかる電圧は商用電源の交流のサイン波なのでヒーターに流れる電流は、ＯＮしてからＯＦＦするまでの間はサイン波になる。また、商用電源ラインに流れる電流波形はヒーター（Ａ）及びヒーター（Ｂ）の波形を合成したものとなり、ゼロクロスから４．４９ｍｓｅｃまで電流は０Ａで、４．４９ｍｓｅｃから６．０３ｍｓｅｃまでヒーター（Ｂ）に流れる電流波形で、６．０３ｍｓｅｃから次のゼロクロスの１０ｍｓｅｃまでヒーター（Ａ）に流れる電流にヒーター（Ｂ）に流れる電流が加えられた波形になる。

【００１２】図６は、電力７５％、６０％、３０％の時の通電波形を示す図である。また、図５はこの時の振幅を“１”としたときの第３次、第５次、第７次の高調波電流を計算した結果である。例えば、ヒーター（Ａ）とヒーター（Ｂ）の振幅をそれぞれ５Ａとすれば、４５％の時の第３次高調波電流は、合計で６Ａ流れる。

【００１３】尚、一般的な画像形成装置は、ヒーターの他に低電圧電源回路を有しており、本装置の給紙／搬送のためのＤＣモータやビデオコントローラ等のために電源を供給しているが、ヒーターで消費される電流は低電圧電源回路で消費される電流よりも十分に大きいので、本発明に関係のない低電圧電源回路で消費される電流は説明を簡単にするために無視することとする。

【００１４】

【発明が解決しようとする課題】しかしながら、上記従来例では、ヒーターに流す電流を制御するトライアックを用いてヒーターの温度を所望の値になるように制御する際に、商用電源の半周期のうちのあるタイミングでオンしてから商用電源の電圧が０Ｖ（ゼロクロスのポイント）になるまで電流を流し続けて制御する位相制御を用いると、オンするタイミングが９０°及び２７０°の位相近傍では高調波電流が大きくなるため、商用電源ラインに使用されているトランス等が高調波電流により発熱するなどの影響を及ぼしている。

【００１５】この対策として、高調波電流を低減するためにゼロクロスポイントの０°及び１８０°の位相近傍のタイミングでオンして制御することが考えられるが、商用電源の半波毎の電流変化が大きいため、画像形成装

置と同じラインの商用電源に接続されている機器に対してフリッカ（例えば、蛍光灯のちらつき等）の影響が生じてしまう。

【００１６】本発明は、上記課題を解決するためになされたもので、商用電源の半サイクル毎の電流の変動が少ない画像形成装置及びその制御方法を提供することを目的とする。

【００１７】

【課題を解決するための手段】上記目的を達成するために、本発明による画像形成装置は、複数の発熱手段による発熱に基づき記録媒体に現像剤を定着させる定着手段と、前記発熱手段により発熱された定着手段の温度を検出する温度検出手段と、前記温度検出手段により検出された温度に応じて前記複数の発熱手段の発熱量を制御する制御手段とを有し、前記制御手段は、商用電源の半サイクル毎に前記複数の発熱手段への通電量を位相制御により制御し、複数の半サイクルを一纏まりで一定の制御電力を設定し、前記設定された制御電力に基づき前記複数の発熱手段の発熱量を制御することを特徴とする。

【００１８】また、上記目的を達成するために、本発明による画像形成装置の制御方法は、複数の発熱手段による発熱に基づき記録媒体に現像剤を定着させる際に、前記発熱手段による発熱温度を検出する温度検出工程と、前記温度検出工程で検出された温度に応じて前記複数の発熱手段の発熱量を制御する制御工程とを有し、前記制御工程は、商用電源の半サイクル毎に前記複数の発熱手段への通電量を位相制御により制御し、複数の半サイクルを一纏まりで一定の制御電力を設定し、前記設定された制御電力に基づき前記複数の発熱手段の発熱量を制御することを特徴とする。

【００１９】

【発明の実施の形態】以下、図面を参照しながら本発明に係る実施の形態を詳細に説明する。

【００２０】図７は、画像形成装置の電気的構成を示すブロック図である。同図において、１は電源スイッチ（ＳＷ）であり、画像形成装置の電源をＯＮ／ＯＦＦするためのものである。２はノイズフィルタであり、発生するノイズをＡＣラインに伝搬しないようにノイズを低減するものである。３はフューザ制御部であり、熱定着を行うための熱源となる定着ヒーター１１９の温度を温度センサ５により検出し、エンジンコントローラ１０５でその温度が一定になるようにＯＮ／ＯＦＦ制御を行うためのものである。

【００２１】４は低電圧電源ユニットであり、ビデオコントローラ部１００への電源を供給する。５は温度センサであり、定着ヒーター１１９の温度を検出する。６はファンモータ、７はファンモータドライバである。８は受光素子であり、レーザ走査光を受光する。９はＢＤ回路であり、受光素子８がレーザ走査光を受光すると、ＢＤ信号として出力する。１０は高電圧電源であり、一次帯電器１１１、感光ドラム１１２、現像器１１３、転写帯電器１１４等に高電圧を供給する。

【００２２】１１はスキャナモータ、１２はスキャナモータドライバ、１３はメインモータ、１４はメインモータドライバ、１５は紙サイズセンサ、１６は紙有無センサ、１７はドアセンサ、１８は給紙センサ、１９は排紙センサ、２０はカートリッジセンサである。

【００２３】また、エンジンコントローラ１０５には、エンジン部を制御するＣＰＵ１０５ａ、そのＣＰＵ１０５ａが制御を実行時に使用する作業領域や各種テーブル等が定義されているＲＡＭ１０５ｂ、ＣＰＵ１０５ａの制御プログラムや制御データを格納しているＲＯＭ１０５ｃが含まれる。一方、エンジンコントローラ１０５とビデオＩ／Ｆ回路２１を介してデータを授受するビデオコントローラ１０３には、同様にＣＰＵ１０３ａ、ＲＡＭ１０３ｂ、ＲＯＭ１０３ｃが含まれ、データを一時記憶するためのバッファ１０３ｄ、操作パネル１０４から設定された設定値等を記憶する不揮発性記憶媒体１０３ｆが含まれる。

【００２４】図８は、図７に示したフューザ制御部３の構成を示す回路ブロック図である。図８に示すＣＰＵ１０５ａは、ヒーター１１９の温度を温度センサ５で検知し、検知した温度に応じてトライアック８０１Ａ及び８０１ＢをＯＮするタイミングを変化させることでヒーター１１９に流す電流を制御するものである。ここで、ヒーター１１９は２本並列に接続され、各々のヒーター１１９Ａ及び１１９Ｂに通電する電流を制御するためのトライアック８０１Ａ及び８０１Ｂに接続されている。

【００２５】尚、本実施形態では、説明を簡単にするために、２本のヒーター１１９Ａ及び１１９Ｂの抵抗値と発熱量は同じとする。また、ＣＰＵ１０５ａはトライアック８０１Ａ及び８０１Ｂを制御するための信号としてヒーター制御信号８１０Ａ及び８１０Ｂを出力する。

【００２６】図９は、商用電源の電圧波形とヒーターの電流波形との関係を示す図である。図示するように、本実施形態では、図８に示すゼロクロス検知回路８０２に商用電源の電圧のゼロクロス部の上下数ボルトにゼロクロス検知範囲を設定しておき、ゼロクロス検知回路８０２がそのゼロクロス検知範囲に応じてゼロクロス信号を出力する。また、ＣＰＵ１０５ａは、温度センサ５で検知した温度情報によりヒーターの通電量を計算する。尚、片方のヒーターの半周期全てに通電したときの通電量を５０％とした場合、５％刻みの通電量（電力比率）と通電を開始する位相及びゼロクロスからのタイミングは、図１０に示すように計算で求められるので、予め通電量と通電開始タイミングの情報を制御データテーブルとしてＲＯＭ１０５ｃに格納しておく。

【００２７】次に、ＣＰＵ１０５ａはヒーターの温度から計算した通電量を基にゼロクロス信号からヒーター１１９Ａ及び１１９ＢをＯＮするまでの時間をタイマー８

０３Ａ及び８０３Ｂにそれぞれセットする。そして、ゼロクロス検知回路８０２からゼロクロス信号８２０を入力すると、ヒーター制御信号８１０Ａ及び８１０Ｂを“Ｌｏｗ”レベルにしてタイマー８０３Ａ及び８０３Ｂをスタートさせる。その後、設定時間が経過し、タイマー８０３Ａがストップすると、ヒーター制御信号８１０Ａを“Ｈｉｇｈ”レベルにする。また、タイマー８０３Ｂがストップすると、ヒーター制御信号８１０Ｂを“Ｈｉｇｈ”レベルにする。同様に、次のゼロクロス信号８２０でヒーター制御信号８１０Ａ及び８１０Ｂを“Ｌｏｗ”レベルにセットし、上述の制御を繰り返す。

【００２８】このように、ＣＰＵ１０５ａからのヒーター制御信号８１０Ａ及び８１０Ｂにより、フューザ制御部３のトライアック８０１Ａ及び８０１ＢのＯＮ又はＯＦＦがＳＳＲ８０４Ａ及び８０４Ｂによって制御される。ここで、ヒーター制御信号（８１０Ａ，８１０Ｂ）が“Ｈｉｇｈ”レベルであれば、ヒーター（１１９Ａ，１１９Ｂ）に通電する電流を流すように制御する。つまり、ヒーター制御信号８１０Ａはトライアック８０１Ａの制御を行い、ヒーター１１９Ａに通電する電流を制御し、またヒーター制御信号８１０Ｂはトライアック８０１Ｂの制御を行い、ヒーター１１９Ｂに通電する電流を制御する。そして、トライアック（８０１Ａ，８０１Ｂ）は、ヒーター制御信号（８１０Ａ，８１０Ｂ）により一度電流を流し始めると、次のゼロクロスを検知するタイミングまでヒーター（１１９Ａ，１１９Ｂ）に電流を流し続ける。従って、ヒーター制御信号（８１０Ａ，８１０Ｂ）を次のゼロクロス信号８２０より前に“Ｌｏｗ”レベルするように制御してもよい。

【００２９】次に、ヒーター１１９Ａに対してヒーター１１９Ｂの通電量が２倍になるように制御する場合について説明する。図９に示したように、両方のヒーター１１９Ａ及び１１９Ｂに通電する電流は、ヒーター１１９Ａに通電する電流とヒーター１１９Ｂに通電する電流を加えた波形になる。従って、商用電源から画像形成装置に供給される電源は、両方のヒーター１１９Ａ及び１１９Ｂに通電する電流と低電圧電源部４で消費される電流をあわせた波形になる。説明を簡略化するために、低圧電源部４で消費される電流を無視してヒーター１１９Ａ及び１１９Ｂに流れる電流について説明を行う。

【００３０】図１１は、ヒーター１１９Ａ及び１１９Ｂに通電する電流波形を示す図である。この例では、ヒーター１１９Ａ及び１１９Ｂに通電する電力が７５％のときと６０％のときと１５％のときをそれぞれ示している。また、図１２及び図１３は１５％、３０％、４５％、６０％、７５％、９０％、１００％の制御電力で制御した場合のヒーター１１９Ａ、ヒーター１１９ＢのＯＮ位相角とＯＮタイミング及び振幅を“１”として３次高調波、５次高調波、６次高調波の波形をフーリエ変換して求めた値を示す図である。本実施形態では、４半波分を一纏まりとし、これを繰り返してヒーター１１９Ａ及び１１９Ｂの通電を制御する場合について説明する。

【００３１】電力が７５％の時の電流波形は、４半波分の平均がヒーター１１９Ａに電力が５０％になるように電流を流し、ヒーター１１９Ｂに電力が１００％になるように電流を流した時を示している。ここで、ヒーター１１９Ａ、ヒーター１１９Ｂのトータルの電力を１００％とすれば、ヒーター１１９Ａのみが１００％のときの電力は５０％となる。従って、電力が７５％での制御では、ヒーター１１９Ａが２５％でヒーター１１９Ｂが５０％となり、併せて７５％になる。図１１乃至図１３よりヒーター１１９Ａの第一半波はＰａ１＝３０％の電力で、第二半波はＰａ２＝２０％の電力で、第三半波はＰａ３＝２０％の電力で、第四半波はＰａ４＝３０％の電力で発熱するように制御する。また、ヒーター１１９Ｂは、第一から第四半波がＰｂ１＝Ｐｂ２＝Ｐｂ３＝Ｐｂ４＝５０％の電力で発熱するように制御する。従って、第一半波のヒーター１１９Ａとヒーター１１９Ｂを併せた発熱電力は第一半波でＰ１＝８０％、第二半波でＰ２＝７０％、第三半波でＰ３＝７０％、第四半波でＰ４＝８０％となり、第一半波から第四半波までの平均は７５％になる。

【００３２】このときのヒーター１１９Ａ，１１９Ｂの電流の第３高調波は、図１２及び図１３よりヒーター１１９Ａの第一半波から第四半波が０．３１、ヒーター１１９Ｂの第一半波から第四半波が０．００となる。従って、図５に示す従来の制御の場合のヒーター１１９Ａが０．３２でヒーター１１９Ｂが０．００と比較してもヒーター１１９Ａについては０．０１少なくなる。また、振幅が１０Ａの場合には、第三高調波が０．１Ａ少なくなる。

【００３３】即ち、第一半波から第二半波の電力変動分は１０％減少し、第二半波から第三半波の電力変動は発生しない。そして、第三半波から第四半波の変化分は１０％増加する。第四半波から次の第一半波の電力の変動は発生しない。従って、電力変動も少ない。

【００３４】尚、実施形態では、４半波を一纏まりとして高調波電流を低減し、電力変動を少なくする例を示したが、４半波以外の波数を一纏まりとして通電制御パターンを設定しても同様の効果が得られる。

【００３５】また、ヒーター１１９Ａとヒーター１１９Ｂの発熱比を１：２に設定したが、１：２の以外の比率でも同じように通電制御パターンを設定すれば、電力変動と高調波を低減した制御になる。

【００３６】尚、実施形態における制御は、図１２及び図１３に示す電力とヒーターＡ，ＢのＯＮタイミングを９０°及び２７０°のタイミングを含まないように設定することでタイミングを制御するものである。

【００３７】上述した実施形態によれば、トライアックを用いて半周期毎にヒーターに流す電流を所望の値にな

るように制御する際に、予めＲＯＭ１０５ｃに格納されているテーブルに従って、ヒーターに流し始めるタイミングが９０°及び２７０°の近くの位相にならないようにオンするタイミングを制限し、この制限により増減する半周期分の電流値を前後の半周期に振り分けて複数の半周期の平均が所望の電流値になるように制御することにより、高調波電流を低減させることができると共に、この時の半周期毎の電流の変化が少なくなるように半周期毎の電流値を振り分けて、電流を流し始めるタイミングを制御することによりフリッカを低減させることができる。

【００３８】尚、本発明は複数の機器（例えば、ホストコンピュータ，インタフェイス機器，リーダ，プリンタなど）から構成されるシステムに適用しても、一つの機器からなる装置（例えば、複写機，ファクシミリ装置など）に適用してもよい。

【００３９】また、本発明の目的は前述した実施形態の機能を実現するソフトウェアのプログラムコードを記録した記憶媒体を、システム或いは装置に供給し、そのシステム或いは装置のコンピュータ（ＣＰＵ若しくはＭＰＵ）が記憶媒体に格納されたプログラムコードを読出し実行することによっても、達成されることは言うまでもない。

【００４０】この場合、記憶媒体から読出されたプログラムコード自体が前述した実施形態の機能を実現することになり、そのプログラムコードを記憶した記憶媒体は本発明を構成することになる。

【００４１】プログラムコードを供給するための記憶媒体としては、例えばフロッピーディスク，ハードディスク，光ディスク，光磁気ディスク，ＣＤ－ＲＯＭ，ＣＤ－Ｒ，磁気テープ，不揮発性のメモリカード，ＲＯＭなどを用いることができる。

【００４２】また、コンピュータが読出したプログラムコードを実行することにより、前述した実施形態の機能が実現されるだけでなく、そのプログラムコードの指示に基づき、コンピュータ上で稼働しているＯＳ（オペレーティングシステム）などが実際の処理の一部又は全部を行い、その処理によって前述した実施形態の機能が実現される場合も含まれることは言うまでもない。

【００４３】更に、記憶媒体から読出されたプログラムコードが、コンピュータに挿入された機能拡張ボードやコンピュータに接続された機能拡張ユニットに備わるメモリに書込まれた後、そのプログラムコードの指示に基づき、その機能拡張ボードや機能拡張ユニットに備わるＣＰＵなどが実際の処理の一部又は全部を行い、その処理によって前述した実施形態の機能が実現される場合も含まれることは言うまでもない。

【００４４】

【発明の効果】以上説明したように、本発明によれば、商用電源の半サイクル毎の電流の変動を少なくでき、同じ商用電源に接続されている機器に与える影響を抑えることができる。特に、同じ商用電源に接続されている照明器具のちらつきを少なくすることができる。

【００４５】また、高調波電流を低減できるので商用電源ラインの電源設備への影響を低減できる。

【００４６】

【図面の簡単な説明】

【図１】一般的な画像形成装置の構造を示す断面図である。

【図２】定着ヒーターと加圧ローラの構成を示す側断面図である。

【図３】商用電源の電圧波形とヒーターに流す電流の関係を示す図である。

【図４】ヒーター（Ａ）の発熱量に対してヒーター（Ｂ）の発熱量が２倍になるように制御した場合の電流波形を示す図である。

【図５】制御電力に対するヒーター（Ａ）とヒーター（Ｂ）のＯＮタイミングの関係を示す図である。

【図６】電力７５％、６０％、３０％の時の通電波形を示す図である。

【図７】画像形成装置の電気的構成を示すブロック図である。

【図８】図７に示したフューザ制御部３の構成を示す回路ブロック図である。

【図９】商用電源の電圧波形とヒーターの電流波形との関係を示す図である。

【図１０】通電量（電力比率）と通電を開始する位相及びゼロクロスからのタイミングを示す図である。

【図１１】ヒーター１１９Ａ及び１１９Ｂに通電する電流波形を示す図である。

【図１２】１５％、３０％、４５％、６０％、７５％、９０％、１００％の制御電力で制御した場合のヒーター１１９Ａ、ヒーター１１９ＢのＯＮ位相角とＯＮタイミング及び振幅を“１”として３次高調波、５次高調波、６次高調波の波形をフーリエ変換して求めた値を示す図である。

【図１３】１５％、３０％、４５％、６０％、７５％、９０％、１００％の制御電力で制御した場合のヒーター１１９Ａ、ヒーター１１９ＢのＯＮ位相角とＯＮタイミング及び振幅を“１”として３次高調波、５次高調波、６次高調波の波形をフーリエ変換して求めた値を示す図である。

【符号の説明】

１　電源ＳＷ
２　ノイズフィルタ
３　フューザ制御部
４　低電圧電源ユニット
５　温度センサ
６　ファン
７　ファンモータドライバ

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８　受光素子
９　ＢＤ回路
１０　高電圧電源
１１　スキャナモータ
１２　スキャナモータドライバ
１３　メインモータ
１４　メインモータドライバ
１５　紙サイズセンサ
１６　紙有無センサ
１７　ドアセンサ
１８　給紙センサ
１９　排紙センサ
２０　カートリッジセンサ
２１　ビデオＩ／Ｆ回路
１００　ビデオコントローラ回路
１０１　ホストＩ／Ｆ回路
１０３　ビデオコントローラ
１０３ａ　ＣＰＵ
１０３ｂ　ＲＡＭ
１０３ｃ　ＲＯＭ
１０３ｄ　バッファ
１０３ｆ　不揮発性記憶媒体

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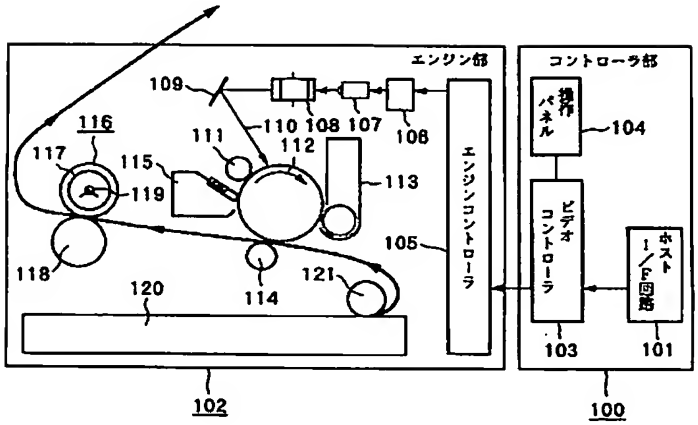
＊１０４　操作パネル
１０５　エンジンコントローラ
１０５ａ　ＣＰＵ
１０５ｂ　ＲＡＭ
１０５ｃ　ＲＯＭ
１０６　レーザドライバ
１０７　レーザダイオード
１０８　ポリゴンミラー
１０９　ミラー
１１０　レーザ光
１１１　一次帯電器
１１２　感光ドラム
１１３　現像器
１１４　転写帯電器
１１５　クリーニング器
１１６　定着器
１１７　定着ローラ
１１８　加圧ローラ
１１９　定着ヒーター
１２０　給紙カセット
１２１　給紙ローラ
＊

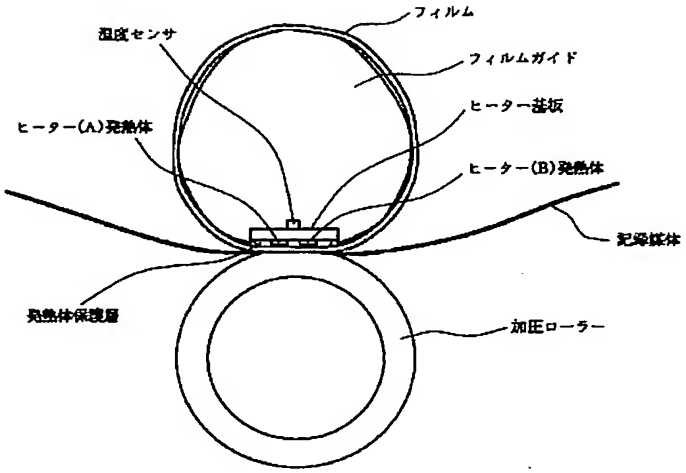
【図１】



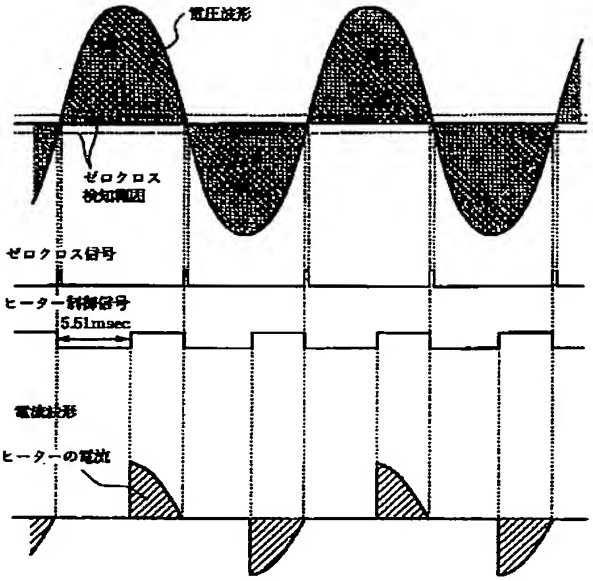
【図１０】

電力比率	ON位相	50Hzの ONタイミング
50.0％	0.0°	0.00ms
45.0％	46.6°	2.59ms
40.0％	60.5°	3.36ms
35.0％	71.4°	3.97ms
30.0％	80.9°	4.49ms
25.0％	90.0°	5.00ms
20.0％	99.1°	5.51ms
15.0％	108.6°	6.03ms
10.0％	119.5°	6.64ms
5.0％	133.4°	7.41ms
0.0％	180.0°	10.00ms

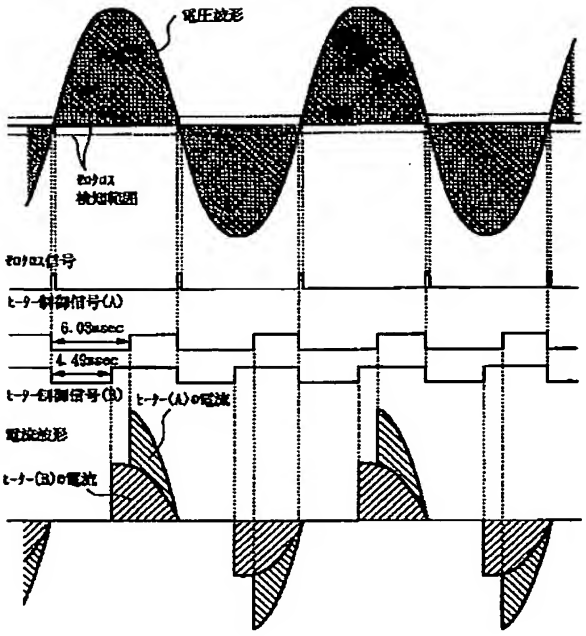
【図２】


フィルム
温度センサ
フィルムガイド
ヒーター基板
ヒーター(A)発熱体
ヒーター(B)発熱体
記録媒体
発熱体保護層
加圧ローラー

【図３】


電圧波形
ゼロクロス
検知範囲
ゼロクロス信号
ヒーター制御信号
5.51msec
電流波形
ヒーターの電流

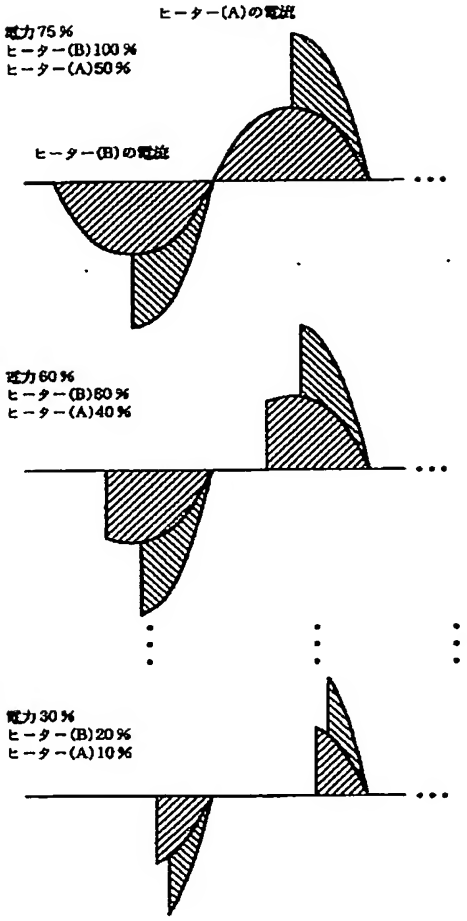
【図４】


電圧波形
ゼロクロス
検知範囲
ゼロクロス信号
ヒーター制御信号(A)
6.03msec
4.49msec
ヒーター制御信号(B)
ヒーター(A)の電流
電流波形
ヒーター(B)の電流

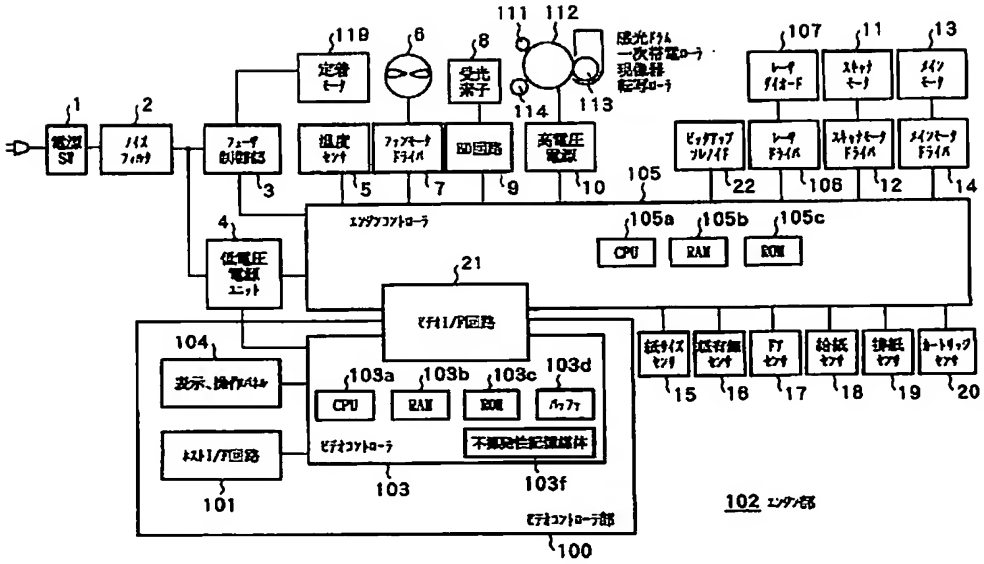
【図５】

従来の技術						
制御電力		ヒータA	Pa	ヒータB	Pb	高調波の合計
15%	ON位相角	133°	5%	120°	10%	
	ONタイミング(50Hz時)	7.41ms		6.64ms		
	3次高調波	0.17		0.24		0.41
	5次高調波	0.12		0.14		0.26
	7次高調波	0.07		0.07		0.14
30%	ON位相角	120°	10%	99°	20%	
	ONタイミング(50Hz時)	6.64ms		5.51ms		
	3次高調波	0.24		0.31		0.55
	5次高調波	0.14		0.11		0.25
	7次高調波	0.07		0.10		0.17
45%	ON位相角	109°	15%	81°	30%	
	ONタイミング(50Hz時)	6.03ms		4.49ms		
	3次高調波	0.29		0.31		0.60
	5次高調波	0.13		0.11		0.24
	7次高調波	0.08		0.10		0.18
60%	ON位相角	99°	20%	61°	40%	
	ONタイミング(50Hz時)	5.51ms		3.36ms		
	3次高調波	0.31		0.24		0.55
	5次高調波	0.11		0.14		0.25
	7次高調波	0.10		0.07		0.17
75%	ON位相角	90°	25%	0°	50%	
	ONタイミング(50Hz時)	5.00ms		0.00ms		
	3次高調波	0.32		0.00		0.32
	5次高調波	0.11		0.00		0.11
	7次高調波	0.11		0.00		0.11
90%	ON位相角	81°	30%	0°	50%	
	ONタイミング(50Hz時)	4.49ms		0.00ms		
	3次高調波	0.31		0.00		0.31
	5次高調波	0.11		0.00		0.11
	7次高調波	0.10		0.00		0.10
100%	ON位相角	0°	50%	0°	50%	
	ONタイミング(50Hz時)	0.00ms		0.00ms		
	3次高調波	0.00		0.00		0.00
	5次高調波	0.00		0.00		0.00
	7次高調波	0.00		0.00		0.00

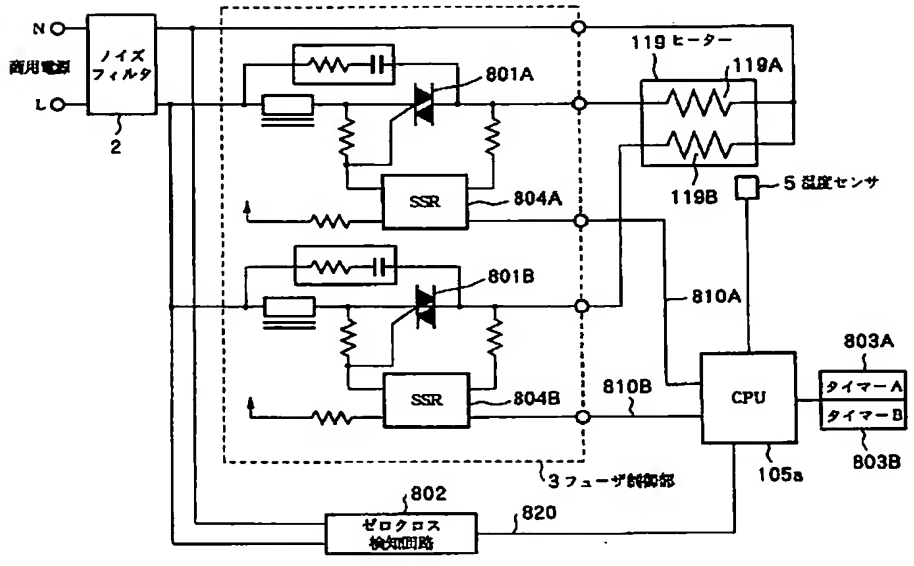
【図６】



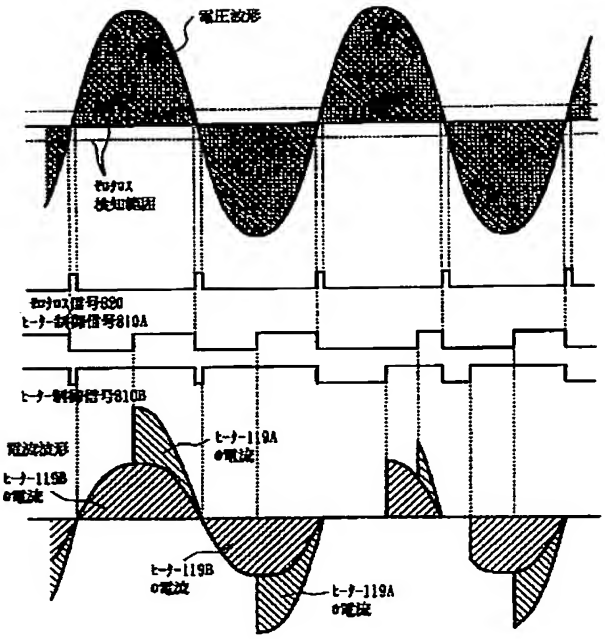
【図７】


111
112
119
6
8
107
11
13
1
2
114
113
3
5
7
9
10
105
22
108
12
14
4
105a
105b
105c
CPU
RAM
21
104
103a
103b
103c
103d
15
16
17
18
19
20
103
103f
101
102
100

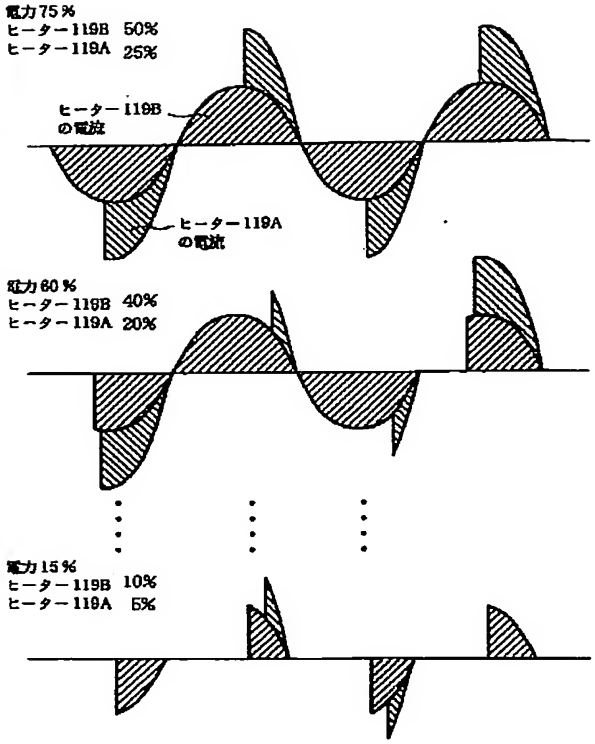
【図８】


N
商用電源
L
ノイズフィルタ
2
801A
SSR
804A
801B
SSR
804B
119 ヒーター
119A
119B
5 温度センサ
810A
810B
CPU
803A
タイマーA
タイマーB
803B
105a
3 フューザ制御部
802
ゼロクロス検知回路
820

【図９】



【図１１】



【図１２】

高調波低向上制御図							
		第一半波			第二半波		
制御電力		ヒーターA Pa1	ヒーターB Pb1	P1	ヒーターA Pa2	ヒーターB Pb2	P2
15%	ON位相角	180° 0%	109° 15%	15%	120° 10%	139° 5%	15%
	ONタイミング(50Hz時)	10.00ms	6.03ms		6.64ms	7.41ms	
	3次高調波	0.00	0.29		0.24	0.17	
	5次高調波	0.00	0.13		0.14	0.12	
	7次高調波	0.00	0.08		0.07	0.07	
30%	ON位相角	99° 20%	133° 5%	25%	180° 0%	71° 35%	35%
	ONタイミング(50Hz時)	5.51ms	7.41ms		10.00ms	3.97ms	
	3次高調波	0.31	0.17		0.00	0.29	
	5次高調波	0.11	0.12		0.00	0.13	
	7次高調波	0.10	0.07		0.00	0.08	
45%	ON位相角	81° 30%	120° 10%	40%	180° 0%	0° 50%	50%
	ONタイミング(50Hz時)	4.49ms	6.64ms		10.00ms	0.00ms	
	3次高調波	0.31	0.24		0.00	0.00	
	5次高調波	0.11	0.14		0.00	0.00	
	7次高調波	0.10	0.07		0.00	0.00	
60%	ON位相角	120° 10%	61° 40%	50%	81° 30%	61° 40%	70%
	ONタイミング(50Hz時)	6.64ms	3.96ms		4.49ms	3.36ms	
	3次高調波	0.24	0.24		0.31	0.24	
	5次高調波	0.14	0.14		0.11	0.14	
	7次高調波	0.07	0.07		0.10	0.07	
75%	ON位相角	81° 30%	0° 50%	80%	99° 20%	0° 50%	70%
	ONタイミング(50Hz時)	4.49ms	0.00ms		5.51ms	0.00ms	
	3次高調波	0.31	0.00		0.31	0.00	
	5次高調波	0.11	0.00		0.11	0.00	
	7次高調波	0.10	0.00		0.10	0.00	
90%	ON位相角	61° 40%	0° 50%	90%	99° 20%	0° 50%	70%
	ONタイミング(50Hz時)	3.36ms	0.00ms		5.51ms	0.00ms	
	3次高調波	0.24	0.00		0.31	0.00	
	5次高調波	0.14	0.00		0.11	0.00	
	7次高調波	0.07	0.00		0.10	0.00	
100%	ON位相角	0° 50%	0° 50%	100%	0° 50%	0° 50%	100%
	ONタイミング(50Hz時)	0.00ms	0.00ms		0.00ms	0.00ms	
	3次高調波	0.00	0.00		0.00	0.00	
	5次高調波	0.00	0.00		0.00	0.00	
	7次高調波	0.00	0.00		0.00	0.00	

【図１３】

高調波低向上制御										
第三半波			第四半波			高調波ON合計(半波ごと)	半波ごとの電力の増減		
ヒーターA Pa3	ヒーターB Pb3	P3	ヒーターA Pa4	ヒーターB Pb4	P4		P1-P2	P2-P3	P3-P4
120° 10%	133° 5%	15%	180° 0%	109° 15%	15%		0%	0%	0%
6.64ms	7.41ms		10.00ms	6.03ms					
0.24	0.17		0.00	0.29		0.35			
0.14	0.12		0.00	0.13		0.19			
0.07	0.07		0.00	0.08		0.11			
180° 0%	71° 35%	35%	99° 20%	133° 5%	25%		-10%	0%	10%
10.00ms	3.97ms		10.00ms	7.41ms					
0.00	0.29		0.31	0.17		0.38			
0.00	0.13		0.11	0.12		0.18			
0.00	0.08		0.10	0.07		0.13			
180° 0%	0° 50%	50%	81° 30%	120° 10%	40%		-10%	0%	10%
10.00ms	0.00ms		4.49ms	6.64ms					
0.00	0.00		0.31	0.24		0.28			
0.00	0.00		0.11	0.14		0.13			
0.00	0.00		0.10	0.07		0.08			
81° 30%	61° 40%	70%	120° 10%	81° 40%	50%		-20%	0%	20%
4.49ms	3.36ms		6.64ms	3.36ms					
0.31	0.24		0.24	0.24		0.52			
0.11	0.14		0.14	0.14		0.26			
0.10	0.07		0.07	0.07		0.15			
99° 20%	0° 50%	70%	81° 30%	0° 50%	50%		10%	0%	-10%
5.51ms	0.00ms		4.49ms	0.00ms					
0.31	0.00		0.31	0.00		0.31			
0.11	0.00		0.11	0.00		0.11			
0.10	0.00		0.10	0.00		0.10			
99° 20%	0° 50%	70%	61° 40%	0° 50%	90%		20%	0%	-20%
5.51ms	0.00ms		3.36ms	0.00ms					
0.31	0.00		0.24	0.00		0.28			
0.11	0.00		0.14	0.00		0.13			
0.10	0.00		0.07	0.00		0.08			
0° 50%	0° 50%	100%	0° 50%	0° 50%	100%		0%	0%	0%
0.00ms	0.00ms		0.00ms	0.00ms					
0.00	0.00		0.00	0.00		0.00			
0.00	0.00		0.00	0.00		0.00			
0.00	0.00		0.00	0.00		0.00			

PATENT ABSTRACTS OF JAPAN

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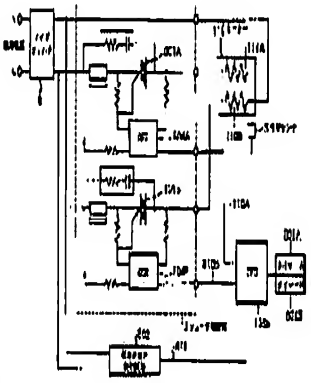
G03G 21/00

(21)Application number : 10-216127
(22)Date of filing : 30.07.1998

(71)Applicant : CANON INC
(72)Inventor : SUZUKI HIDEKI

(54) IMAGE FORMING DEVICE AND ITS CONTROL METHOD

(57)Abstract:
PROBLEM TO BE SOLVED: To reduce the fluctuation of a power source in every half cycle of a commercial power source by controlling energizing amount to plural heat generating means in every half cycle of the commercial power source, setting fixed control power by putting plural half cycles in a lump and controlling the calorific value of the heat generating means based on the set control power.



SOLUTION: In a zero cross detection circuit 802, a zero cross detection range is set to several volts above and below the zero cross part of the voltage of the commercial power source, and a zero cross signal is outputted in accordance with the detected range. A CPU 105a calculates the energizing amount of heaters 119A and 119B according to temperature information detected by a temperature sensor 5. Then, the triacs 801A and 801B of a fuser control part 3 are on/off controlled by an SSR 804A and 804B according to heater control signals 810A and 810B from the CPU 105a. When the heater control signals (810A and 810B) are at a high level, a current energizing the heater (119A and 119B) is applied.

LEGAL STATUS

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[Date of sending the examiner's decision of rejection] 06.03.2006

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

Searching PAJ http://www19.ipdl.ncipi.go.jp/PA1/result/detail/mai...

JP,2000-047520,A [CLAIMS] http://www4.ipdl.ncipi.go.jp/cgi-bin/tran_web_cgi_ejj...

* NOTICES *

CLAIMS

[Claim(s)]
[Claim 1] A fixing means to fix a developer to a record medium based on generation of heat by two or more exoergic means, A temperature detection means to detect the temperature of the fixing means which generated heat with said exoergic means, It has the control means which controls the calorific value of two or more of said exoergic means according to the temperature detected by said temperature detection means. Said control means Image formation equipment characterized by controlling the amount of energization to said two or more exoergic means by phase control for every half cycle of a source power supply, setting up fixed control power for two or more half cycles with a bundle ball, and controlling the calorific value of two or more of said exoergic means based on said set-up control power.
[Claim 2] Said control means is image formation equipment according to claim 1 characterized by setting up an energization pattern to timing other than this in the case of the amount of energization from which about 270 degrees of about 90 degrees of a source power supply of timing which starts energization for said exoergic means serve as a phase with a phase, and energizing by using two or more half cycles as a bundle ball.
[Claim 3] Said control means is image formation equipment according to claim 1 characterized by setting up an energization pattern to timing other than this in the case of the amount of energization from which the timing which starts energization for said exoergic means serves as a larger phase of a source power supply smaller than 99 degrees than 81 degrees, or a larger phase smaller than 279 degrees than 160 degrees, and energizing by using two or more half cycles as a bundle ball.
[Claim 4] Image formation equipment according to claim 2 or 3 characterized by setting up a setup of said energization pattern so that the power fluctuation for every half cycle may decrease.
[Claim 5] The temperature detection process of detecting the exoergic temperature by said exoergic means in case a developer is fixed to a record medium based on generation of heat by two or more exoergic means, It has the control process which controls the calorific value of two or more of said exoergic means according to the temperature detected at said temperature detection process. Said control process The control approach of the image formation equipment characterized by controlling the amount of energization to said two or more exoergic means by phase control for every half cycle of a source power supply, setting up fixed control power for two or more half cycles with a bundle ball, and controlling the calorific value of two or more of said exoergic means based on said set-up control power.
[Claim 6] Said control process is the control approach of the image formation equipment according to claim 5 characterized by setting up an energization pattern to timing other than this in the case of the amount of energization from which about 270 degrees of about 90 degrees of a source power supply of timing which starts energization for said exoergic means serve as a phase with a phase, and energizing by using two or more half cycles as a bundle ball.
[Claim 7] Said control process is the control approach of the image formation equipment according to claim 5 characterized by setting up an energization pattern to timing other than this in the case of the amount of energization from which the timing which starts energization for said exoergic means serves as a larger phase of a source power supply smaller than 99 degrees than 81 degrees, or a larger phase smaller than 279 degrees than 160 degrees, and energizing by using two or more half cycles as a bundle ball.

[Claim 8] The control approach of the image formation equipment according to claim 6 or 7 characterized by setting up a setup of said energization pattern so that the power fluctuation for every half cycle may decrease.

[Translation done.]

JP,2000-047520,A [DETAILED DESCRIPTION] http://www4.ipdl.ncipi.go.jp/cgi-bin/tran_web_cgi_ejje

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the temperature control of the fixing heater of the image formation equipment which used the electrophotography process.
[0002]
[Description of the Prior Art] Drawing 1 is the sectional view showing the structure of common image formation equipment, and shows the case of a laser beam printer in this example. In this drawing, 100 is the controller section, and once developing the electrical signal which is code data inputted through the host I/F circuit of 101 from the non-illustrated host computer with a dot image with a video controller 103 and storing in the memory of the video controller 103 interior, it is sent out to the engine section mentioned later as a video signal.
[0003] 102 is the engine section which performs image formation which used the electrophotography process, each internal element is controlled by the engine controller 105, and transfer of various signals with the controller section 100 is also performed through the engine controller 105. Here, the video signal inputted into the video interface section (un-illustrating) of the engine controller 105 is sent out to a laser driver 106, and ON/OFF of semiconductor laser 107 is controlled. The laser beam 110 by which outgoing radiation was carried out from this semiconductor laser 107 is deflected by the polygon mirror 108, turns into scan light of the longitudinal direction of a photoconductor drum 112, and is projected on a photoconductor drum 112 through a mirror 109.
[0004] After a photoconductor drum 112 rotates in the direction of an arrow head in drawing and being primarily charged with the primary electrification vessel 111, an electrostatic latent image is formed in photoconductor drum 112 front face in response to the exposure according to ON/OFF of a laser beam 110. And after a coloring charged particle (a toner is called hereafter) is given by the development counter 113 and **** is obtained, the above-mentioned **** is copied with the imprint electrification vessel 114 by the record medium taken out one sheet at a time from the sheet paper cassette 120 with the feed roller 121. Moreover, the imprint remaining toner is wiped away with the cleaning vessel 115 from the front face of a photoconductor drum 112, and the following image formation process is equipped with a photoconductor drum 112.
[0005] After the record medium in which the non-established toner image appeared is inserted in a fixing assembly 116 on the other hand and a permanent fixing image is obtained, a record medium is discharged outside the plane according to the direction of an arrow head in drawing as a final print. In addition, the arrow head in drawing shows the feed miracle of the record medium which is taken out from a sheet paper cassette 120 and conveyed. Moreover, the fixing assembly 116 has the heater (fixing heater) 119 in the fixing roller 117 in the air, a fixing roller 117 is overheated by energizing at a heater 119, the output of the sensor (un-illustrating) which detects the skin temperature of a fixing roller 117 is inputted into a temperature controller (un-illustrating), ON/OFF of the heater 119 is carried out, and predetermined skin temperature is maintained. The pressurization roller 118 is pressed by the fixing roller 117 with an energization means (un-illustrating), the non-established toner in the condition of having appeared in the record medium is heated and pressurized with a record medium within the nip of a fixing roller 117 and the pressurization roller 118 to make, and permanent fixing of it is carried out.
[0006] Moreover, the engine controller 105 judges the temperature of a fixing assembly 116, controls a fixing heater 119 by the temperature sensor attached in contact with the fixing roller 117 of a fixing assembly 116 using the FUYUZA control section mentioned later for details, and performs temperature control of a fixing assembly 116 with it.
[0007] Drawing 2 is the sectional side elevation showing the configuration of a fixing heater and a pressurization roller. As for the fixing heater 119, the current with which it connects with juxtaposition and two heaters (A) and a heater (B) are poured by the respectively separate control circuit at two heaters is controlled to be shown in drawing 2 .
[0008] This control is performed by CPU in the engine controller 105, the calorific value of each heater is heated by changing the time amount passed using the triac which controls the current specifically passed at each heater based on the temperature information acquired with the thermo sensor, and it is controlling to become desired temperature. Here, the current passed at each heater controls by changing the time amount (ON time amount) currently energized in the period of the half cycle of a source power supply

to be shown in drawing 3 . In the control program, the current when all the half cycles turn on was made into 100%, the time of turning all off was made into 0%, and the time amount energized so that a current value can be divided equally is memorized beforehand. For example, when passing 40% of current, even the phase of 0 degree - 99 degrees is controlled at OFF, and even the phase of 99 degrees - 180 degrees is controlled to ON. This control program sets up a phase angle by the time amount from a zero cross, for example, 50Hz of frequency of source power supply about 99 degrees of phases are set to 5.51msec. When energizing 40% of current at a heater, a program will turn ON a control signal, if a timer is started, 5.51msec passes and a timer stops, after setting a timer to 5.51msec and receiving a zero cross signal. A current control circuit (triac) starts energization of a current in response to ON signal, and continues energization to the following zero cross.

[0009] Moreover, in order to control for the calorific value of a heater (B) to double to the calorific value of a heater (A), the time amount which passes a current so that the current passed at a heater (B) may become twice the current passed at a heater (A) is controlled. As shown in drawing 4 , when the case where a heater (A) and a heater (B) are made to both generate heat fully is made into 100% and the case where exoergic control is carried out at 45% is specifically considered, make a heater (A) generate heat 15%, a heater (B) is made to generate heat 30%, and it is made for both to become 45% in all.

[0010] Drawing 5 is drawing showing the relation of the on-timing of a heater (A) and a heater (B) to control power. When controlling control power to 45%, about 109 degrees (A) of heaters are controlled by the phase to ON, and about 81 degrees (B) of heaters are controlled by the phase to ON. That is, it is begun after 4.49msec(s) for a current to be passed after 6.03msec(s) from a zero cross at a heater (A), and to pass a current from a zero cross at a heater (B) at the beginning of a sink. And the current passed at a heater (A) and a heater (B) is turned OFF to the timing of the following zero cross.

[0011] In addition, a heater is a resistance load, and the current which flows at a heater since the electrical potential difference concerning a heater is the sine wave of an alternating current of a source power supply becomes a sine wave after turning on until it turns off. Moreover, the current wave form where it flows to source-power-supply Rhine becomes what compounded the wave of a heater (A) and a heater (B), and a current is 0A from a zero cross to 4.49msec(s), and it is the current wave form where it flows at a heater (B) from 4.49msec to 6.03msec(s), and becomes the wave by which the current which flows at a heater (B) was added to the current which flows at a heater (A) from 6.03msec to 10msec(s) of the following zero cross.

[0012] Drawing 6 is drawing showing the energization wave at the time of 75% of power, 60%, and 30%. Moreover, drawing 5 is the result of calculating the 3rd higher-harmonic current [5th / 7th] when setting the amplitude at this time to "1." 6A For example, 5A, then the 3rd higher-harmonic current at the time of 45% flow the amplitude of a heater (A) and a heater (B) in total, respectively.

[0013] In addition, although common image formation equipment has the low-battery power circuit other than a heater and supplies the power source for the DC motor for feeding/conveyance of this equipment, a video controller, etc., since the current consumed at a heater is fully larger than the current consumed in a low-battery power circuit, suppose that the current consumed in the low-battery power circuit which is unrelated to this invention is ignored in order to simplify explanation.

[0014]

[Problem(s) to be Solved by the Invention] However, in case it controls to become the value of a request of the temperature of a heater using the triac which controls the current passed at a heater by the above-mentioned conventional example If the phase control which continues passing a current and controls it is used after turning on to a certain timing of the half periods of a source power supply until the electrical potential difference of a source power supply is set to 0V (point of a zero cross) Since a higher-harmonic current becomes large near [whose timing to turn on is 90 degrees and 270 degrees] the phase, the transformer currently used for source-power-supply Rhine has done the effect of generating heat according to a higher-harmonic current etc.

[0015] As this cure, in order to reduce a higher-harmonic current, it is possible to turn on and to control by timing 0 degree and 180 degrees near the phase of the zero cross point, but since the current change for every half wave of a source power supply is large, the effect of flickers (for example, flicker of a fluorescent lamp etc.) will arise to the device connected to the source power supply of the same Rhine as image formation equipment.

[0016] This invention was made in order to solve the above-mentioned technical problem, and it aims at offering the image formation equipment with little fluctuation and its control approach of a current for every half cycle of a source power supply.

[0017]

[Means for Solving the Problem] In order to attain the above-mentioned purpose, the image formation equipment by this invention A fixing means to fix a developer to a record medium based on generation of heat by two or more exoergic means, A temperature detection means to detect the temperature of the fixing means which generated heat with said exoergic means, It has the control means which controls the calorific value of two or

JP,2000-047520,A [DETAILED DESCRIPTION] http://www4.ipdl.ncipi.go.jp/cgi-bin/tran_web_cgi_ejje

more of said exoergic means according to the temperature detected by said temperature detection means. Said control means The amount of energization to said two or more exoergic means is controlled by phase control for every half cycle of a source power supply, fixed control power is set up for two or more half cycles with a bundle ball, and it is characterized by controlling the calorific value of two or more of said exoergic means based on said set-up control power.

[0018] In order to attain the above-mentioned purpose, moreover, the control approach of the image formation equipment by this invention The temperature detection process of detecting the exoergic temperature by said exoergic means in case a developer is fixed to a record medium based on generation of heat by two or more exoergic means, It has the control process which controls the calorific value of two or more of said exoergic means according to the temperature detected at said temperature detection process. Said control process The amount of energization to said two or more exoergic means is controlled by phase control for every half cycle of a source power supply, fixed control power is set up for two or more half cycles with a bundle ball, and it is characterized by controlling the calorific value of two or more of said exoergic means based on said set-up control power.

[0019]

[Embodiment of the Invention] Hereafter, the gestalt of operation concerning this invention is explained to a detail, referring to a drawing.

[0020] Drawing 7 is the block diagram showing the electric configuration of image formation equipment. In this drawing, 1 is an electric power switch (SW) and is for carrying out ON/OFF of the power source of image formation equipment. 2 is a noise filter, and it reduces a noise so that the noise to generate may not be spread to AC Rhine. 3 is a FUYUZA control section and is for performing ON/OFF control so that a temperature sensor 5 may detect the temperature of the fixing heater 119 used as the heat source for performing heat fixing and the temperature may become fixed by the engine controller 105.

[0021] 4 is a low-battery power supply unit, and supplies the power source to the video controller section 100. 5 is a temperature sensor and detects the temperature of a fixing heater 119. 6 is a fan motor and 7 is a fan motor driver. 8 is a photo detector and receives laser scan light. 9 is BD circuit, and if a photo detector 8 receives laser scan light, it will be outputted as a BD signal. 10 is a high-voltage power source and supplies the high voltage to the primary electrification machine 111, a photoconductor drum 112, a development counter 113, and imprint electrification machine 114 grade.

[0022] 11 -- a scanner motor and 12 -- scanner Motor Driver and 13 -- the Maine motor and 14 -- for a paper existence sensor and 17, as for a feed sensor and 19, a door sensor and 18 are [Maine Motor Driver and 15 / a paper size sensor and 16 / a delivery sensor and 20] cartridge sensors.

[0023] Moreover, RAM105b by which the working area where CPU105a which controls the engine section, and its CPU105a use control at the time of activation, various tables, etc. are defined, and ROM105c which stores the control program and control data of CPU105a are contained in the engine controller 105. On the other hand, CPU103a, RAM103b, and ROM103c are similarly contained in the engine controller 105 and the video controller 103 which deliver and receive data through the video I/F circuit 21, and 103f of non-volatile storages which memorize the set point set up from buffer 103d for storing data temporarily and a control panel 104 is contained in them.

[0024] Drawing 8 is the circuit block diagram showing the configuration of the FUYUZA control section 3 shown in drawing 7 . CPU105a shown in drawing 8 controls the current passed at a heater 119 by changing the timing which detects the temperature of a heater 119 with a temperature sensor 5, and turns on Triacs 801A and 801B according to the detected temperature. Here, it connects with 2 juxtaposition and the heater 119 is connected to the triacs 801A and 801B for controlling the current energized at each heaters 119A and 119B.

[0025] In addition, with this operation gestalt, in order to simplify explanation, the resistance and calorific value of two heaters 119A and 119B presuppose that it is the same. Moreover, CPU105a outputs the heater control signals 810A and 810B as a signal for controlling Triacs 801A and 801B.

[0026] Drawing 9 is drawing showing the relation between the voltage waveform of a source power supply, and the current wave form of a heater. With this operation gestalt, the zero cross detection range is set as the zero cross detecting circuit 802 shown in drawing 8 at the several volts upper and lower sides of the zero cross section of the electrical potential difference of a source power supply, and the zero cross detecting circuit 802 outputs a zero cross signal according to the zero cross detection range so that it may illustrate. Moreover, CPU105a calculates the amount of energization of a heater using the temperature information detected with the temperature sensor 5. In addition, when the amount of energization when energizing at all the half periods of one of the two's heater is made into 50%, since the phase which starts the amount of energization of a unit (rate of a power ratio) and energization 5%, and the timing from a zero cross are called for by count as shown in drawing 10 , they are beforehand stored in ROM105c by using information on the amount of energization, and energization initiation timing as a control data table.

[0027] Next, CPU105a sets to Timers 803A and 803B time amount until it turns on Heaters 119A and 119B from a zero cross signal based on the amount of energization calculated from the temperature of a heater,

respectively. And if the zero cross signal 820 is inputted from the zero cross detecting circuit 802, the heater control signals 810A and 810B will be made into "Low" level, and Timers 803A and 803B will be started. Then, if the setup time passes and timer 803A stops, heater control signal 810A will be made into "High" level. Moreover, a stop of timer 803B makes heater control signal 810B "High" level. Similarly, the heater control signals 810A and 810B are set to "Low" level by the following zero cross signal 820, and above-mentioned control is repeated.

[0028] Thus, ON or OFF of the triacs 801A and 801B of the FUYUZA control section 3 is controlled by SSR(s) 804A and 804B by the heater control signals 810A and 810B from CPU105a. Here, if a heater control signal (810A, 810B) is "High" level, it will control to pass the current energized at a heater (119A, 119B). That is, heater control signal 810A controls triac 801A, the current energized to heater 119A is controlled, and heater control signal 810B controls triac 801B, and controls the current energized to heater 119B. And once a triac (801A, 801B) begins to pass a current with a heater control signal (810A, 810B), it will continue passing a current at a heater (119A, 119B) to the timing which detects the following zero cross. Therefore, you may control to carry out a heater control signal (810A, 810B) "Low" level before the following zero cross signal 820.

[0029] Next, the case where it controls for the amount of energization of heater 119B to double to heater 119A is explained. As shown in drawing 9 , the current energized at both heaters 119A and 119B becomes the wave which added the current energized to heater 119A, and the current energized to heater 119B. Therefore, the power source supplied to image formation equipment becomes the wave with which the current energized at both heaters 119A and 119B and the current consumed in the low-battery power supply section 4 were united from a source power supply. In order to simplify explanation, the current which disregards the current consumed in the low voltage power supply section 4, and flows at Heaters 119A and 119B is explained.

[0030] Drawing 11 is drawing showing the current wave form energized at Heaters 119A and 119B. This example shows the time of being a time of being a time of the power energized at Heaters 119A and 119B being 75%, and 60%, and 15%, respectively. Moreover, drawing 12 and drawing 13 are drawings showing the value which set ON phase angle, the on-timing, and the amplitude of heater 119A at the time of controlling by 15%, 30%, 45%, 60%, 75%, 90%, and 100% of control power, and heater 119B to "1", carried out the Fourier transform of the wave of the 3rd higher harmonic, the 5th higher harmonic, and the 6th higher harmonic and be calculated. The case where use a part for four half waves as a bundle ball, repeat this, and energization of Heaters 119A and 119B is controlled by this operation gestalt is explained.

[0031] The current wave form in case power is 75% shows the time of passing a current so that power may be set to sink and heater 119B to 100% in a current, as the average for four half waves is set to heater 119A and power sets it 50%. Here, power in case only 100%, then heater 119A are 100% becomes 50% about the total power of heater 119A and heater 119B. Therefore, in control at 75%, heater 119B becomes [heater 119A] 50% at 25%, and power becomes 75% in all. From drawing 11 thru/or drawing 13 , the first half wave of heater 119A is the power of 1= 30% of Pa, the second half wave is the power of 2= 20% of Pa, the third half wave is the power of 3= 20% of Pa, and the fourth half wave is controlled to generate heat with the power of 4= 30% of Pa. Moreover, heater 119B is controlled so that the fourth half wave generates heat from the first with the power of 4= 50% of Pb1=Pb2=Pb3=Pb(s). Therefore, by the first half wave, the exoergic power which combined heater 119A and heater 119B of the first half wave becomes P3=70% by the third half wave P2=70%, and becomes P4=80% by the second half wave, P1=80%, at the fourth half wave, and the average to the fourth half wave becomes 75% from the first half wave.

[0032] As for the 3rd higher harmonic of the current of the heaters 119A and 119B at this time, the first half wave to the fourth half wave of 0.31 and heater 119B is set to 0.00 from the first half wave of heater 119A by the fourth half wave from drawing 12 and drawing 13 . Therefore, in 0.32, its heater 119A in the conventional control shown in drawing 5 decreases 0.01 about heater 119A, even if heater 119B compares with 0.00. 0.1A Moreover, when the amplitude is 10A, third harmonic decreases.

[0033] That is, the amount of [of the first half wave to the second half wave] power fluctuation decreases 10%, and power fluctuation of the second half wave to the third half wave is not generated. And a changed part of the third half wave to the fourth half wave increases 10%. Fluctuation of the power of the first following half wave is not generated from the fourth half wave. Therefore, there is also little power fluctuation.

[0034] In addition, although the operation gestalt showed the example which reduces a higher-harmonic current and lessens power fluctuation by using four half waves as a bundle ball, the same effectiveness is acquired even if it sets up an energization control pattern by using the wave numbers other than 4 half waves as a bundle ball.

[0035] Moreover, although the exoergic ratio of heater 119A and heater 119B was set as 1:2, if an energization control pattern is similarly set up by ratios other than 1:2, it will become the control which reduced power fluctuation and a higher harmonic.

[0036] In addition, the control in an operation gestalt controls timing by setting up the on-timing of the power and Heaters A and B which are shown

in drawing 12 and drawing 13 so that timing (90 degrees and 270 degrees) may not be included.

[0037] In case it controls to become the value of a request of the current passed at a heater for every half period using a triac according to the operation gestalt mentioned above The timing turned on so that it may not become the phase of near whose timing which it begins to pass at a heater is 90 degrees and 270 degrees according to the table beforehand stored in ROM105c is restricted. While being able to reduce a higher-harmonic current by controlling so that the current value for the half period fluctuated by this limit is distributed to the half period of order and the average of two or more half periods becomes a desired current value The current value for every half period can be distributed so that change of the current for every half period at this time may decrease, and a flicker can be reduced by controlling the timing which begins to pass a current.

[0038] In addition, even if it applies this invention to the system which consists of two or more devices (for example, a host computer, an interface device, a reader, a printer, etc.), it may be applied to the equipments (for example, a copying machine, facsimile apparatus, etc.) which consist of one device.

[0039] Moreover, it cannot be overemphasized by the purpose of this invention supplying the storage which recorded the program code of the software which realizes the function of the operation gestalt mentioned above to a system or equipment, and carrying out read-out activation of the program code with which the computer (CPU or MPU) of the system or equipment was stored in the storage that it is attained.

[0040] In this case, the function of the operation gestalt which the program code itself read from the storage mentioned above will be realized, and the storage which memorized that program code will constitute this invention.

[0041] As a storage for supplying a program code, a floppy disk, a hard disk, an optical disk, a magneto-optic disk, CD-ROM, CD-R, a magnetic tape, the memory card of a non-volatile, ROM, etc. can be used, for example.

[0042] Moreover, it cannot be overemphasized that it is contained also when the function of the operation gestalt which performed a part or all of processing that OS (operating system) which is working on a computer is actual, based on directions of the program code, and the function of the operation gestalt mentioned above by performing the program code which the computer read is not only realized, but was mentioned above by the processing is realized.

[0043] Furthermore, after the program code read from a storage is written in the memory with which the functional expansion unit connected to the functional add-in board inserted in the computer or a computer is equipped, it cannot be overemphasized that it is contained also when the function of the operation gestalt which performed a part or all of processing that CPU with which the functional add-in board and functional expansion unit are equipped based on directions of the program code is actual, and mentioned above by the processing is realized.

[0044]

[Effect of the Invention] As explained above, according to this invention, fluctuation of the current for every half cycle of a source power supply can be lessened, and the effect which it has on the device connected to the same source power supply can be suppressed. A flicker of lighting fitting especially connected to the same source power supply can be lessened.

[0045] Moreover, since a higher-harmonic current can be reduced, the effect of the power-source facility on source-power-supply Rhine can be reduced.

[0046]

[Translation done.]

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TECHNICAL FIELD

[Field of the Invention] This invention relates to the temperature control of the fixing heater of the image formation equipment which used the electrophotography process.

[Translation done.]

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PRIOR ART

[Description of the Prior Art] Drawing 1 is the sectional view showing the structure of common image formation equipment, and shows the case of a laser beam printer in this example. In this drawing, 100 is the controller section, and once developing the electrical signal which is code data inputted through the host I/F circuit of 101 from the non-illustrated host computer with a dot image with a video controller 103 and storing in the memory of the video controller 103 interior, it is sent out to the engine section mentioned later as a video signal.

[0003] 102 is the engine section which performs image formation which used the electrophotography process, each internal element is controlled by the engine controller 105, and transfer of various signals with the controller section 100 is also performed through the engine controller 105. Here, the video signal inputted into the video interface section (un-illustrating) of the engine controller 105 is sent out to a laser driver 106, and ON/OFF of semiconductor laser 107 is controlled. The laser beam 110 by which outgoing radiation was carried out from this semiconductor laser 107 is deflected by the polygon mirror 108, turns into scan light of the longitudinal direction of a photoconductor drum 112, and is projected on a photoconductor drum 112 through a mirror 109.

[0004] After a photoconductor drum 112 rotates in the direction of an arrow head in drawing and being primarily charged with the primary electrification vessel 111, an electrostatic latent image is formed in photoconductor drum 112 front face in response to the exposure according to ON/OFF of a laser beam 110. And after a coloring charged particle (a toner is called hereafter) is given by the development counter 113 and **** is obtained, the above-mentioned **** is copied with the imprint electrification vessel 114 by the record medium taken out one sheet at a time from the sheet paper cassette 120 with the feed roller 121. Moreover, the imprint remaining toner is wiped away with the cleaning vessel 115 from the front face of a

JP,2000-047520,A [PRIOR ART] http://www4.ipdl.ncipi.go.jp/cgi-bin/tran_web_cgi_ejje

photoconductor drum 112, and the following image formation process is equipped with a photoconductor drum 112.

[0005] After the record medium in which the non-established toner image appeared is inserted in a fixing assembly 116 on the other hand and a permanent fixing image is obtained, a record medium is discharged outside the plane according to the direction of an arrow head in drawing as a final print. In addition, the arrow head in drawing shows the feed miracle of the record medium which is taken out from a sheet paper cassette 120 and conveyed. Moreover, the fixing assembly 116 has the heater (fixing heater) 119 in the fixing roller 117 in the air, a fixing roller 117 is overheated by energizing at a heater 119, the output of the sensor (un-illustrating) which detects the skin temperature of a fixing roller 117 is inputted into a temperature controller (un-illustrating), ON/OFF of the heater 119 is carried out, and predetermined skin temperature is maintained. The pressurization roller 118 is pressed by the fixing roller 117 with an energization means (un-illustrating), the non-established toner in the condition of having appeared in the record medium is heated and pressurized with a record medium within the nip of a fixing roller 117 and the pressurization roller 118 to make, and permanent fixing of it is carried out.

[0006] Moreover, the engine controller 105 judges the temperature of a fixing assembly 116, controls a fixing heater 119 by the temperature sensor attached in contact with the fixing roller 117 of a fixing assembly 116 using the FUYUZA control section mentioned later for details, and performs temperature control of a fixing assembly 116 with it.

[0007] Drawing 2 is the sectional side elevation showing the configuration of a fixing heater and a pressurization roller. As for the fixing heater 119, the current with which it connects with juxtaposition and two heaters (A) and a heater (B) are poured by the respectively separate control circuit at two heaters is controlled to be shown in drawing 2 .

[0008] This control is performed by CPU in the engine controller 105, the calorific value of each heater is heated by changing the time amount passed using the triac which controls the current specifically passed at each heater based on the temperature information acquired with the thermo sensor, and it is controlling to become desired temperature. Here, the current passed at each heater controls by changing the time amount (ON time amount) currently energized in the period of the half cycle of a source power supply to be shown in drawing 3 . In the control program, the current when all the half cycles turn on was made into 100%, the time of turning all off was made into 0%, and the time amount energized so that a current value can be divided equally is memorized beforehand. For example, when passing 40% of current, even the phase of 0 degree - 99 degrees is controlled at OFF, and even the phase of 99 degrees - 180 degrees is controlled to ON. This control program sets up a phase angle by the time amount from a zero cross, for example, 50Hz of frequency of source power supply about 99 degrees of phases are set to 5.51msec. When energizing 40% of current at a heater, a program will turn ON a control signal, if a timer is started, 5.51msec passes and a timer stops, after setting a timer to 5.51msec and receiving a zero cross signal. A current control circuit (triac) starts energization of a current in response to ON signal, and continues energization to the following zero cross.

[0009] Moreover, in order to control for the calorific value of a heater (B) to double to the calorific value of a heater (A), the time amount which passes a current so that the current passed at a heater (B) may become twice the current passed at a heater (A) is controlled. As shown in drawing 4 , when the case where a heater (A) and a heater (B) are made to both generate heat fully is made into 100% and the case where exoergic control is carried out at 45% is specifically considered, make a heater (A) generate heat 15%, a heater (B) is made to generate heat 30%, and it is made for both to become 45% in all.

[0010] Drawing 5 is drawing showing the relation of the on-timing of a heater (A) and a heater (B) to control power. When controlling control power to 45%, about 109 degrees (A) of heaters are controlled by the phase to ON, and about 81 degrees (B) of heaters are controlled by the phase to ON. That is, it is begun after 4.49msec(s) for a current to be passed after 6.03msec(s) from a zero cross at a heater (A), and to pass a current from a zero cross at a heater (B) at the beginning of a sink. And the current passed at a heater (A) and a heater (B) is turned OFF to the timing of the following zero cross.

[0011] In addition, a heater is a resistance load, and the current which flows at a heater since the electrical potential difference concerning a heater is the sine wave of an alternating current of a source power supply becomes a sine wave after turning on until it turns off. Moreover, the current wave form where it flows to source-power-supply Rhine becomes what compounded the wave of a heater (A) and a heater (B), and a current is 0A from a zero cross to 4.49msec(s), and it is the current wave form where it flows at a heater (B) from 4.49msec to 6.03msec(s), and becomes the wave by which the current which flows at a heater (B) was added to the current which flows at a heater (A) from 6.03msec to 10msec(s) of the following zero cross.

[0012] Drawing 6 is drawing showing the energization wave at the time of 75% of power, 60%, and 30%. Moreover, drawing 5 is the result of calculating the 3rd higher-harmonic current [5th / 7th] when setting the amplitude at this time to "1." 6A For example, 5A, then the 3rd higher-harmonic current at the time of 45% flow the amplitude of a heater (A) and a heater (B) in total, respectively.

[0013] In addition, although common image formation equipment has the

low-battery power circuit other than a heater and supplies the power source for the DC motor for feeding/conveyance of this equipment, a video controller, etc., since the current consumed at a heater is fully larger than the current consumed in a low-battery power circuit, suppose that the current consumed in the low-battery power circuit which is unrelated to this invention is ignored in order to simplify explanation.

[Translation done.]

EFFECT OF THE INVENTION

[Effect of the Invention] As explained above, according to this invention, fluctuation of the current for every half cycle of a source power supply can be lessened, and the effect which it has on the device connected to the same source power supply can be suppressed. A flicker of lighting fitting especially connected to the same source power supply can be lessened.
[0045] Moreover, since a higher-harmonic current can be reduced, the effect of the power-source facility on a source-power-supply line can be reduced.

[Translation done.]

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, in case it controls to become the value of a request of the temperature of a heater using the triac which controls the current passed at a heater by the above-mentioned conventional example If the phase control which continues passing a current and controls it is used after turning on to a certain timing of the half periods of a source power supply until the electrical potential difference of a source power supply is set to 0V (point of a zero cross) Since a higher-harmonic current becomes large near [whose timing to turn on is 90 degrees and 270 degrees] the phase, the transformer currently used for source-power-supply Rhine has done the effect of generating heat according to a higher-harmonic current etc.

[0015] As this cure, in order to reduce a higher-harmonic current, it is possible to turn on and to control by timing 0 degree and 180 degrees near the phase of the zero cross point, but since the current change for every half wave of a source power supply is large, the effect of flickers (for example, flicker of a fluorescent lamp etc.) will arise to the device connected to the source power supply of the same Rhine as image formation equipment.

[0016] This invention was made in order to solve the above-mentioned technical problem, and it aims at offering the image formation equipment with little fluctuation and its control approach of a current for every half cycle of a source power supply.

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MEANS

[Means for Solving the Problem] In order to attain the above-mentioned object, the image formation equipment by this invention A fixation means to fix a developer to a record medium based on generation of heat by two or more exoergic means, A temperature detection means to detect the temperature of the fixation means which generated heat with said exoergic means, It has the control means which controls the calorific value of two or more of said exoergic means according to the temperature detected by said temperature detection means. Said control means The amount of energization to said two or more exoergic means is controlled by phase control for every half cycle of a source power supply, fixed control power is set up for two or more half cycles with a bundle ball, and it is characterized by controlling the calorific value of two or more of said exoergic means based on said set-up control power.

[0018] In order to attain the above-mentioned object, moreover, the control approach of the image formation equipment by this invention The temperature detection process of detecting the exoergic temperature by said exoergic means in case a developer is fixed to a record medium based on generation of heat by two or more exoergic means, It has the control process which controls the calorific value of two or more of said exoergic means according to the temperature detected at said temperature detection process. Said control process The amount of energization to said two or more exoergic means is controlled by phase control for every half cycle of a source power supply, fixed control power is set up for two or more half cycles with a bundle ball, and it is characterized by controlling the calorific value of two or more of said exoergic means based on said set-up control power.

[0019]

[Embodiment of the Invention] Hereafter, the gestalt of operation concerning this invention is explained to a detail, referring to a drawing.

[0020] Drawing 7 is the block diagram showing the electric configuration of image formation equipment. In this drawing, 1 is an electric power switch (SW) and is for carrying out ON/OFF of the power source of image formation equipment. 2 is a noise filter, and it reduces a noise so that the noise to generate may not be spread on AC line. 3 is a FUYUZA control section and is for performing ON/OFF control so that a temperature sensor 5 may detect the temperature of the fixing heater 119 used as the heat source for performing heat fixation and the temperature may become fixed by the engine controller 105.

[0021] 4 is a low-battery power supply unit, and supplies the power source to the video controller section 100. 5 is a temperature sensor and detects the temperature of a fixing heater 119. 6 is a fan motor and 7 is a fan motor driver. 8 is a photo detector and receives laser scan light. 9 is BD circuit, and if a photo detector 8 receives laser scan light, it will be outputted as a BD signal. 10 is a high-tension power source and supplies high tension to the primary electrification machine 111, a photoconductor drum 112, a development counter 113, and imprint electrification machine 114 grade.

[0022] 11 -- a scanner motor and 12 -- scanner Motor Driver and 13 -- main motor capacity and 14 -- for a paper existence sensor and 17, as for a feed sensor and 19, a door sensor and 18 are [a main-motor-capacity driver and 15 / a paper size sensor and 16 / a delivery sensor and 20] cartridge sensors.

[0023] Moreover, RAM105b by which the working area where CPU105a which controls the engine section, and its CPU105a use control at the time of activation, various tables, etc. are defined, and ROM105c which stores the control program and control data of CPU105a are contained in the engine controller 105. On the other hand, CPU103a, RAM103b, and ROM103c are similarly contained in the engine controller 105 and the video controller 103 which deliver and receive data through the video I/F circuit 21, and 103f of non-volatile storages which memorize the set point set up from buffer 103d for storing data temporarily and a control panel 104 is contained in them.

[0024] Drawing 8 is the circuit block diagram showing the configuration of the FUYUZA control section 3 shown in drawing 7 . CPU105a shown in drawing 8 controls the current passed at a heater 119 by changing the timing which detects the temperature of a heater 119 with a temperature sensor 5, and turns on Triacs 801A and 801B according to the detected temperature. Here, it connects with 2 juxtaposition and the heater 119 is connected to the triacs 801A and 801B for controlling the current energized at each heaters 119A and 119B.

[0025] In addition, with this operation gestalt, in order to simplify explanation, the resistance and calorific value of two heaters 119A and 119B presuppose that it is the same. Moreover, CPU105a outputs the heater control signals 810A and 810B as a signal for controlling Triacs 801A and 801B.

[0026] Drawing 9 is drawing showing the relation between the voltage waveform of a source power supply, and the current wave form of a heater. With this operation gestalt, the zero cross detection range is set as the zero cross detecting circuit 802 shown in drawing 8 at the several volts upper and lower sides of the zero cross section of the electrical potential difference of a source power supply, and the zero cross detecting circuit 802 outputs a zero cross signal according to the zero cross detection range so that it may illustrate. Moreover, CPU105a calculates the amount of energization of a heater using the temperature information detected with the temperature sensor 5. In addition, when the amount of energization when energizing at all the half periods of one of the two's heater is made into 50%, since the phase which starts the amount of energization of a unit (power ratio) and energization 5%, and the timing from a zero cross are called for by count as shown in drawing 10 , they are beforehand stored in ROM105c by using information on the amount of energization, and energization initiation timing as a control data table.

[0027] Next, CPU105a sets to Timers 803A and 803B time amount until it turns on Heaters 119A and 119B from a zero cross signal based on the amount of energization calculated from the temperature of a heater, respectively. And if the zero cross signal 820 is inputted from the zero cross detecting circuit 802, the heater control signals 810A and 810B will be made into "Low" level, and Timers 803A and 803B will be started. Then, if the setup time passes and timer 803A stops, heater control signal 810A will be made into "High" level. Moreover, a stop of timer 803B makes heater control signal 810B "High" level. Similarly, the heater control signals 810A and 810B are set to "Low" level by the following zero cross signal 820, and above-mentioned control is repeated.

[0028] Thus, ON or OFF of the triacs 801A and 801B of the FUYUZA control section 3 is controlled by SSR(s) 804A and 804B by the heater control signals 810A and 810B from CPU105a. Here, if a heater control signal (810A, 810B) is "High" level, it will control to pass the current energized at a heater (119A, 119B). That is, heater control signal 810A controls triac 801A, the current energized to heater 119A is controlled, and heater control signal 810B controls triac 801B, and controls the current energized to heater 119B. And once a triac (801A, 801B) begins to pass a current with a heater control signal (810A, 810B), it will continue passing a current at a heater (119A, 119B) to the timing which detects the following zero cross. Therefore, you may control to carry out a heater control signal (810A, 810B) "Low" level before the following zero cross signal 820.

[0029] Next, the case where it controls for the amount of energization of heater 119B to double to heater 119A is explained. As shown in drawing 9 ,

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the current energized at both heaters 119A and 119B becomes the wave which added the current energized to heater 119A, and the current energized to heater 119B. Therefore, the power source supplied to image formation equipment becomes the wave with which the current energized at both heaters 119A and 119B and the current consumed in the low-battery power supply section 4 were united from a source power supply. In order to simplify explanation, the current which disregards the current consumed in the low voltage power supply section 4, and flows at Heaters 119A and 119B is explained.

[0030] Drawing 11 is drawing showing the current wave form energized at Heaters 119A and 119B. This example shows the time of being a time of being a time of the power energized at Heaters 119A and 119B being 75%, and 60%, and 15%, respectively. Moreover, drawing 12 and drawing 13 are drawings showing the value which set ON phase angle, the on-timing, and the amplitude of heater 119A at the time of controlling by 15%, 30%, 45%, 60%, 75%, 90%, and 100% of control power, and heater 119B to "1", carried out the Fourier transform of the wave of the 3rd higher harmonic, the 5th higher harmonic, and the 6th higher harmonic and be calculated. The case where use a part for four half waves as a bundle ball, repeat this, and energization of Heaters 119A and 119B is controlled by this operation gestalt is explained.

[0031] The current wave form in case power is 75% shows the time of passing a current so that power may be set to sink and heater 119B to 100% in a current, as the average for four half waves is set to heater 119A and power sets it 50%. Here, power in case only 100%, then heater 119A are 100% becomes 50% about the total power of heater 119A and heater 119B. Therefore, in control at 75%, heater 119B becomes [heater 119A] 50% at 25%, and power becomes 75% in all. From drawing 11 thru/or drawing 13 , the first half wave of heater 119A is the power of 1= 30% of Pa, the second half wave is the power of 2= 20% of Pa, the third half wave is the power of 3= 20% of Pa, and the fourth half wave is controlled to generate heat with the power of 4= 30% of Pa. Moreover, heater 119B is controlled so that the fourth half wave generates heat from the first with the power of 4= 50% of Pb1=Pb2=Pb3=Pb(s). Therefore, by the first half wave, the exoergic power which combined heater 119A and heater 119B of the first half wave becomes P3=70% by the third half wave P2=70%, and becomes P4=80% by the second half wave, P1=80%, at the fourth half wave, and the average to the fourth half wave becomes 75% from the first half wave.

[0032] As for the 3rd higher harmonic of the current of the heaters 119A and 119B at this time, the first half wave to the fourth half wave of 0.31 and heater 119B is set to 0.00 from the first half wave of heater 119A by the fourth half wave from drawing 12 and drawing 13 . Therefore, in 0.32, its heater 119A in the conventional control shown in drawing 5 decreases 0.01 about heater 119A, even if heater 119B compares with 0.00. 0.1A Moreover, when the amplitude is 10A, a third harmonic wave decreases.

[0033] That is, the amount of [of the first half wave to the second half wave] power fluctuation decreases 10%, and power fluctuation of the second half wave to the third half wave is not generated. And a changed part of the third half wave to the fourth half wave increases 10%. Fluctuation of the power of the first following half wave is not generated from the fourth half wave. Therefore, there is also little power fluctuation.

[0034] In addition, although the operation gestalt showed the example which reduces a higher-harmonic current and lessens power fluctuation by using four half waves as a bundle ball, the same effectiveness is acquired even if it sets up an energization control pattern by using the wave numbers other than 4 half waves as a bundle ball.

[0035] Moreover, although the exoergic ratio of heater 119A and heater 119B was set as 1:2, if an energization control pattern is similarly set up by ratios other than 1:2, it will become the control which reduced power fluctuation and a higher harmonic.

[0036] In addition, the control in an operation gestalt controls timing by setting up the on-timing of the power and Heaters A and B which are shown in drawing 12 and drawing 13 so that timing (90 degrees and 270 degrees) may not be included.

[0037] In case it controls to become the value of a request of the current passed at a heater for every half period using a triac according to the operation gestalt mentioned above The timing turned on so that it may not become the phase of near whose timing which it begins to pass at a heater is 90 degrees and 270 degrees according to the table beforehand stored in ROM105c is restricted. While being able to reduce a higher-harmonic current by controlling so that the current value for the half period fluctuated by this limit is distributed to the half period of order and the average of two or more half periods becomes a desired current value The current value for every half period can be distributed so that change of the current for every half period at this time may decrease, and a flicker can be reduced by controlling the timing which begins to pass a current.

[0038] In addition, even if it applies this invention to the system which consists of two or more devices (for example, a host computer, an interface device, a reader, a printer, etc.), it may be applied to the equipments (for example, a copying machine, facsimile apparatus, etc.) which consist of one device.

[0039] Moreover, it cannot be overemphasized by the object of this invention supplying the storage which recorded the program code of the software which realizes the function of the operation gestalt mentioned above to a

system or equipment, and carrying out read-out activation of the program code with which the computer (CPU or MPU) of the system or equipment was stored in the storage that it is attained.

[0040] In this case, the function of the operation gestalt which the program code itself read from the storage mentioned above will be realized, and the storage which memorized that program code will constitute this invention.

[0041] As a storage for supplying a program code, a floppy disk, a hard disk, an optical disk, a magneto-optic disk, CD-ROM, CD-R, a magnetic tape, the memory card of a non-volatile, ROM, etc. can be used, for example.

[0042] Moreover, it cannot be overemphasized that it is contained also when the function of the operation gestalt which performed a part or all of processing that OS (operating system) which is working on a computer is actual, based on directions of the program code, and the function of the operation gestalt mentioned above by performing the program code which the computer read is not only realized, but was mentioned above by the processing is realized.

[0043] Furthermore, after the program code read from a storage is written in the memory with which the functional expansion unit connected to the functional add-in board inserted in the computer or a computer is equipped, it cannot be overemphasized that it is contained also when the function of the operation gestalt which performed a part or all of processing that CPU with which the functional add-in board and functional expansion unit are equipped based on directions of the program code is actual, and mentioned above by the processing is realized.

[Translation done.]

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the sectional view showing the structure of common image formation equipment.

[Drawing 2] It is the sectional side elevation showing the configuration of a fixing heater and an application-of-pressure roller.

[Drawing 3] It is drawing showing the voltage waveform of a source power supply, and the relation of the current passed at a heater.

[Drawing 4] It is drawing showing the current wave form at the time of controlling for the calorific value of a heater (B) to double to the calorific value of a heater (A).

[Drawing 5] It is drawing showing the relation of the on-timing of a heater (A) and a heater (B) to control power.

[Drawing 6] It is drawing showing the energization wave at the time of 75% of power, 60%, and 30%.

[Drawing 7] It is the block diagram showing the electric configuration of image formation equipment.

[Drawing 8] It is the circuit block diagram showing the configuration of the FUYUZA control section 3 shown in drawing 7 .

[Drawing 9] It is drawing showing the relation between the voltage waveform of a source power supply, and the current wave form of a heater.

[Drawing 10] It is drawing showing the amount of energization (power ratio), the phase which starts energization, and the timing from a zero cross.

[Drawing 11] It is drawing showing the current wave form energized at Heaters 119A and 119B.

[Drawing 12] It is drawing showing the value which set ON phase angle, the on-timing, and the amplitude of heater 119A at the time of controlling by 15%, 30%, 45%, 60%, 75%, 90%, and 100% of control power, and heater 119B to "1", carried out the Fourier transform of the wave of the 3rd higher harmonic, the 5th higher harmonic, and the 6th higher harmonic, and was

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calculated.

[Drawing 13] It is drawing showing the value which set ON phase angle, the on-timing, and the amplitude of heater 119A at the time of controlling by 15%, 30%, 45%, 60%, 75%, 90%, and 100% of control power, and heater 119B to "1", carried out the Fourier transform of the wave of the 3rd higher harmonic, the 5th higher harmonic, and the 6th higher harmonic, and was calculated.

[Description of Notations]

1 Power Source SW
2 Noise Filter
3 FUYUZA Control Section
4 Low-Battery Power Supply Unit
5 Temperature Sensor
6 Fan
7 Fan Motor Driver
8 Photo Detector
9 BD Circuit
10 High-Tension Power Source
11 Scanner Motor
12 Scanner Motor Driver
13 Main Motor Capacity
14 Main-Motor-Capacity Driver
15 Paper Size Sensor
16 Paper Existence Sensor
17 Door Sensor
18 Feed Sensor
19 Delivery Sensor
20 Cartridge Sensor
21 Video I/F Circuit
100 Video Controller Circuit
101 Host I/F Circuit
103 Video Controller
103a CPU
103b RAM
103c ROM
103d Buffer
103f Non-volatile storage
104 Control Panel
105 Engine Controller
105a CPU
105b RAM
105c ROM
106 Laser Driver
107 Laser Diode
108 Polygon Mirror
109 Mirror
110 Laser Beam
111 Primary Electrification Machine
112 Photoconductor Drum
113 Development Counter
114 Imprint Electrification Machine
115 Cleaning Machine
116 Fixing Assembly
117 Fixing Roller
118 Application-of-Pressure Roller
119 Fixing Heater
120 Sheet Paper Cassette
121 Feed Roller

[Translation done.]